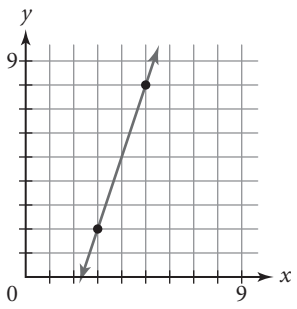
Lesson 4.1 • A Formula for Slope

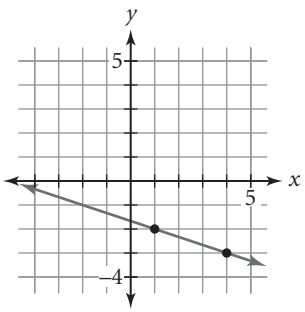
Name _____ Period _____ Date _____

1. Find the slope of each line using a slope triangle or the slope formula.

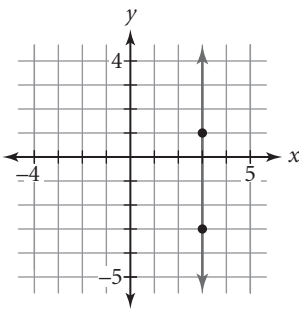
a.



b.



c.



2. Find the slope of the line through each pair of points.

a. (0, 4); (5, 8)

b. (−4.1, 3.8); (2.7, −1.4)

c. $\left(\frac{7}{4}, \frac{1}{2}\right); \left(\frac{1}{4}, 5\right)$

d. (−8, 2); (−8, −5)

3. Given one point on a line and the slope of the line, name *two* other points on the line. Then use the slope formula to check that the slope between each of the two new points and the given point is the same as the given slope.

a. (3, 1); slope $\frac{2}{3}$

b. (4, 2); slope 1

c. (5, 3); slope −1.25

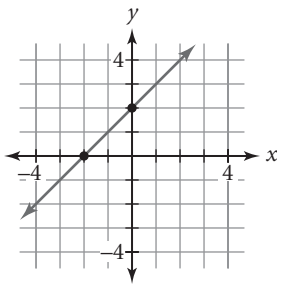
d. (−1, 6); slope 0

e. (−4, −7); slope −2

f. (8, −5); slope $\frac{3}{7}$

4. Write the equation of each line in intercept form.

a.



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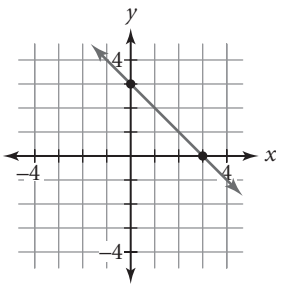
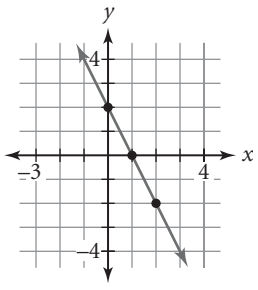
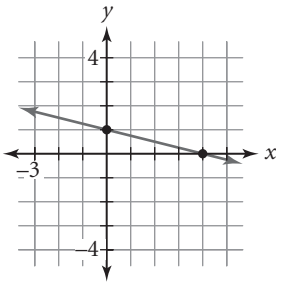


c.



d.

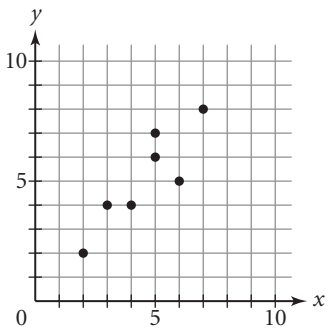


Lesson 4.2 • Writing a Linear Equation to Fit Data

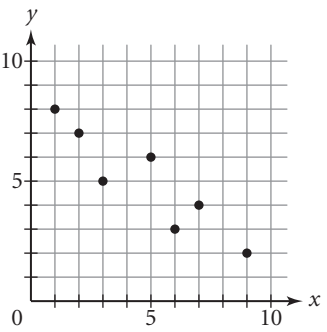
Name _____ Period _____ Date _____

1. For each graph, draw a line that you think best approximates the linear data pattern. Write a few sentences explaining why you think your line is a good fit.

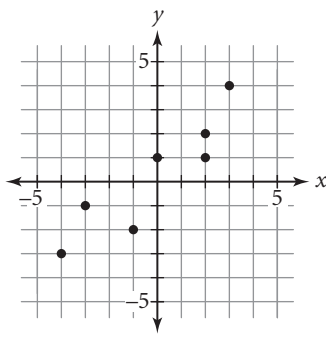
a.



b.

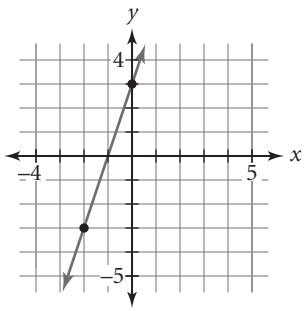


c.



2. Write the equation of the line in each graph in intercept form.

a.



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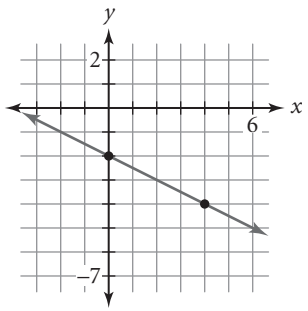
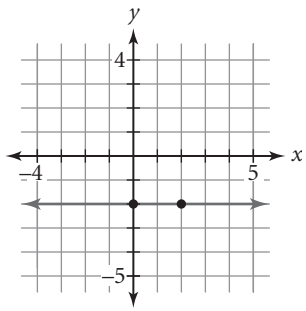


c.



3. Find the slope and the units for the slope for each table or graph.

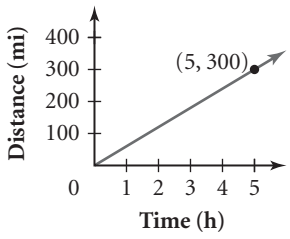
a.

Time (s)	Distance (m)
5	11
10	22

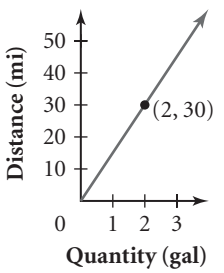
b.

Time (wk)	Money ($)
4	1,800
50	22,500

c.



d.



4. Solve each equation.

a. $3(x + 8) = 18$

b. $-4(x + 5) = 48$

c. $2x + 7 = 15$

d. $-6x - 3 = 39$

e. $4 - 3x = -23$

f. $4(3x - 1) = -40$

g. $-3(5x - 4) = -21$

h. $5(4 - 2x) = 35$

i. $-2(7 - 4x) = -14$

Lesson 4.3 • Point-Slope Form of a Linear Equation

Name _____ Period _____ Date _____

1. Name the slope and one point on the line that each point-slope equation represents.

a. $y = 3 + 2(x - 1)$

b. $y = -7.4 - \frac{3}{4}(x + 1)$

c. $y = \frac{6}{7}(x + 5) - 4.1$

d. $y = -(x - 2)$

2. Write an equation in point-slope form for a line, given its slope and one point that it passes through.

a. Slope 2; (4, 3)

b. Slope $-\frac{2}{3}$; (−6, 7)

c. Slope 0; (−4, 4)

3. Refer to the information in the table to complete the following steps.

x	*y*
−4	−10
−3	−8.5
−1	−5.5
1	−2.5
4	2

a. Find the slope of the line through (−4, −10) and (−3, −8.5). Then find the slope of the lines through three other pairs of points from the table. What can you conclude from your results?

b. Write an equation in point-slope form using the slope you found in 3a and the first point in the table.

c. Write an equation in point-slope form using the third point in the table.

d. Verify that the equations you found in 3b and c are equivalent. Enter one equation into Y1 and the other into Y2 on your calculator, and compare their graphs and tables.

4. The heat index measures the apparent temperature for a given relative humidity. This table shows the heat index for three temperatures at a relative humidity of 90%.

Heat Index for 90% Relative Humidity

Air temperature *x* (°F)	Apparent temperature *y* (°F)
74	72
76	76
78	80

(*heat_index.tripod.com*)

a. Find the rate of change of the data (the slope of the line).

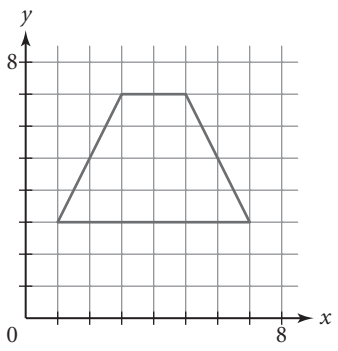
b. Choose one point and write an equation in point-slope form to model the data.

c. Choose another point and write another equation in point-slope form to model the data.

d. Verify that the two equations in 4b and c are equivalent. Enter one equation into Y1 and the other into Y2 on your calculator, and compare their graphs and tables.

e. When the air temperature is 88°F, the apparent temperature is 113°F, and when the air temperature is 91°F, the apparent temperature is 126°F. Are these points on your line? Do you think the heat index is really a linear relationship?

5. For each segment shown in the figure, write an equation in point-slope form for the line that contains the segment.



Lesson 4.4 • Equivalent Algebraic Equations

Name _____ Period _____ Date _____

1. Determine whether or not the expressions in each pair are equivalent. If they are not, change the second expression so that they are equivalent.

a. $2(x + 3) - 1; 2x + 5$

b. $-3(x + 4) + 6; -3x + 6$

c. $5 - 4(x - 1); 4x + 1$

d. $-8 + 6(x - 2); 6x - 20$

2. Rewrite each equation in intercept form. Show your steps. Check your answer by using a calculator graph or table.

a. $y = 5 + 3(x - 4)$

b. $y = -2 + (x + 1)$

c. $y = -0.5(x + 2) - 1$

d. $3y - x = 3$

3. Solve each equation by balancing and tell which property you used for each step. Use the distributive property in two of your solutions.

a. $3(4x - 2) + 5 = 11$

b. $-4(5 + 2x) - 8 = -12$

c. $6 - 5(3x - 2) = -44$

d. $-12 + 3(4 - 5x) = 12$

4. Solve each equation for x. Substitute your value into the original equation to check.

a. $-8(11 - 4x) + 9 = -23$

b. $7 - (8 - x) = 9$

c. $\frac{3}{4}(2x + 4) + 5 = 2$

d. $-8 - \frac{2}{5}(5x + 15) = 4$

5. An equation of a line is $y = -20 - (x + 3.6)$.

a. Name the point used to write the point-slope equation.

b. Find x when y is 0.2.

6. Factor each expression so that the coefficient of x is 1. Use the distributive property to check your work.

a. $4x + 8$

b. $-3x - 27$

c. $-6x + 72$

d. $10x - 250$

7. Solve each equation for the indicated variable.

a. $p = 7(q - 2) + 3$ Solve for q.

b. $3a - 2b = 9$ Solve for b.

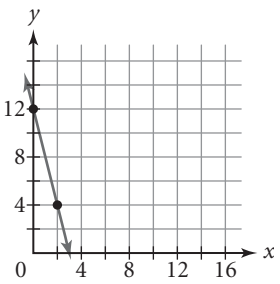
c. $\frac{y + 4}{x - 2} = 14$ Solve for x.

Lesson 4.5 • Writing Point-Slope Equations to Fit Data

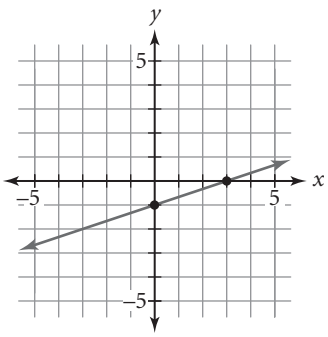
Name _____ Period _____ Date _____

1. Write the point-slope form of the equation for each line.

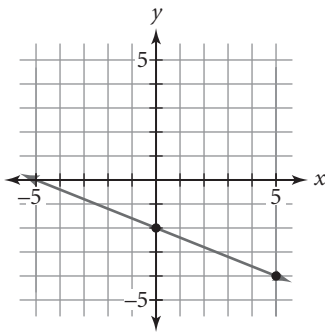
a.



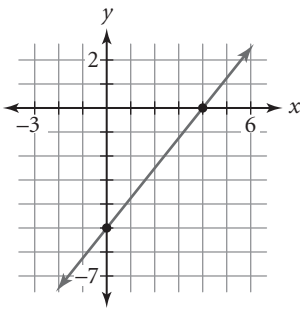
b.



c.

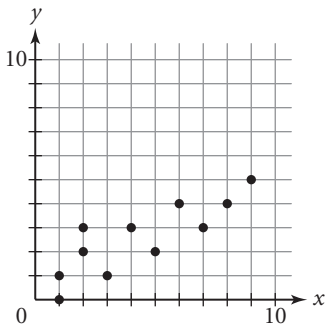


d.

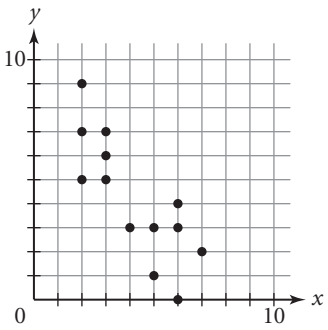


2. Choose two points on each graph so that a line through them closely represents the pattern of all the points on the graph. Use the two points to calculate the slope, and write the equation in point-slope form. Draw the line on your graph.

a.



b.



3. Name the x-intercept of each equation.

a. $y = 24 - 6x$

b. $y = -56 - 7x$

c. $y = 5x - 45$

d. $y = 8 + \frac{2}{3}x$

Lesson 4.6 • More on Modeling

Name _____ Period _____ Date _____

1. This table shows travel times and fares between some stops on the Bay Area Rapid Transit (BART) system in and around San Francisco, California.

BART Travel Times and Fares

From	To	Travel time (min)	Fare ($)
Dublin/Pleasanton	Powell	47	4.70
Civic Center	Balboa Park	9	1.30
Embarcadero	San Leandro	22	3.45
Castro Valley	Daly City	51	4.20
Fremont	16th Street/Mission	52	4.75
Concord	MacArthur	26	3.05
West Oakland	Ashby	9	1.25
Walnut Creek	Union City	55	4.10
Coliseum	Montgomery	21	3.15
El Cerrito Plaza	Hayward	40	2.90
19th Street/Oakland	MacArthur	3	1.25

(*www.bart.gov*)

a. Give the five-number summaries of the travel times and of the fares.

b. Plot the data points in the form (*travel time, fare*).

c. Use the five-number summary values to draw a rectangle on the graph of the data. Name the two Q-points you should use for your line of fit.

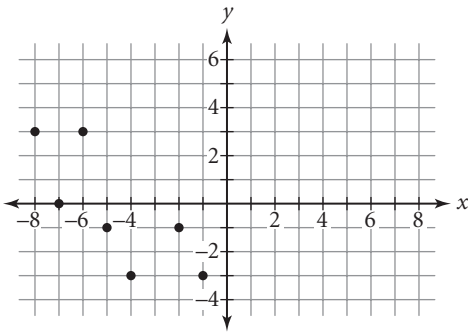
d. Find the equation of the line, and graph the line with your data points.

e. The travel time from Lake Merritt to Richmond is 27 minutes. Predict the fare from Lake Merritt to Richmond.

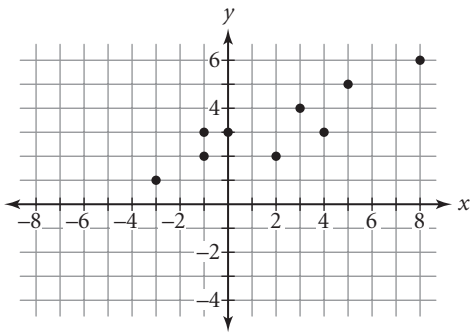
f. The fare from Powell to South San Francisco is $2.95. Predict the travel time from Powell to South San Francisco.

2. Give the coordinates of the Q-points for the data sets.

a.



b.



Lesson 4.7 • Applications of Modeling

Name _____ Period _____ Date _____

1. Use the Q-points of each data set to determine a line of fit. Write the equation in point-slope form, then write each equation in slope-intercept form.

a.

x	−14	−10	−6	−2	6	8	10
y	16	14	18	12	15	8	10

b.

x	−8.2	−4	0	8	10	12	20	28
y	−23.1	−8	−20	0.5	8.3	16	28	32

2. Let x represent time in hours and y represent distance in miles. You can use the equation $y = 38 - 41.5x$ to model someone driving home on a crowded freeway. Use this model to predict

a. the number of miles the person will have gone in 20 minutes.

b. how long it will take the person to get home.

3. Solve each equation symbolically for x. Use another method to verify your solution.

a. $14 - 5(3x - 7) = -26$

b. $2(8 - x) - 15 = 7$

c. $\dfrac{-3(4x - 1)}{5} = -6$

d. $\dfrac{4(8 - 2x)}{x + 3} = 6$

4. Solve each equation for y.

a. $9x - y = 14$

b. $4x + 2y = 12$

c. $-3x + 7y = -14$

d. $x - 3y = -24$

5. The table shows the average price for unleaded regular gasoline in the United States from 1990 to 2003.

a. Find the Q-points and the slope of the Q-line. What is the real-world meaning of the slope?

b. Find the equation of the Q-line.

c. The average price for the first 6 months of 2004 was $1.82. Does your model seem to be a good predictor of the 2004 average price? Explain.

Average Price per Gallon of Gasoline

Year	Price ($)	Year	Price ($)
1990	1.16	1997	1.23
1991	1.14	1998	1.06
1992	1.13	1999	1.17
1993	1.11	2000	1.51
1994	1.11	2001	1.46
1995	1.15	2002	1.36
1996	1.23	2003	1.59

(Energy Information Administration, *World Almanac and Book of Facts 2005*, p. 170)

4. **a.** $\frac{1}{7}$ **b.** 4 **c.** $-\frac{8}{5}$ **d.** $-\frac{1}{36}$

5. **a.** -0.25 **b.** $\frac{5}{8}$ **c.** 36 **d.** $-2z$

6. **a.** $w = 2$ **b.** $v = 3$ **c.** $m = -12$
d. $n = 1.6$ **e.** $x = 0.275$ **f.** $y = -20$

LESSON 4.1 • A Formula for Slope

1. **a.** 3 **b.** $-\frac{1}{3}$, or $-0.\overline{3}$ **c.** Undefined

2. **a.** $\frac{4}{5}$, or 0.8 **b.** $-\frac{5.2}{6.8} = -\frac{13}{17} \approx -0.76$
c. -3 **d.** Undefined

3. Answers will vary; some possible answers:

a. $(0, -1), (6, 3)$ **b.** $(3, 1), (5, 3)$
c. $(1, 8), (9, -2)$ **d.** $(1, 6), (2, 6)$
e. $(-5, -5), (-3, -9)$ **f.** $(1, -8), (15, -2)$

4. **a.** $y = 2 + 1x$, or $y = 1x + 2$
b. $y = 3 - 1x$, or $y = -1x + 3$
c. $y = 2 - 2x$, or $y = -2x + 2$
d. $y = 1 - \frac{1}{4}x$, or $y = -\frac{1}{4}x + 1$

LESSON 4.2 • Writing a Linear Equation to Fit Data

1. Answers will vary.

2. **a.** $y = 3 + 3x$, or $y = 3x + 3$
b. $y = -2 - \frac{1}{2}x$, or $y = -\frac{1}{2}x - 2$
c. $y = -2$

3. **a.** $\frac{11}{5}$ m/s **b.** \$450/wk
c. 60 mi/h **d.** 15 mi/gal

4. **a.** $x = -2$ **b.** $x = -17$ **c.** $x = 4$
d. $x = -7$ **e.** $x = 9$ **f.** $x = -3$
g. $x = 2.2$ **h.** $x = -1.5$ **i.** $x = 0$

LESSON 4.3 • Point-Slope Form of a Linear Equation

1. Point answers may vary; a possible point is given.

a. Slope 2; $(1, 3)$ **b.** Slope $-\frac{3}{4}$; $(-1, -7.4)$
c. Slope $\frac{6}{7}$; $(-5, -4.1)$ **d.** Slope -1; $(2, 0)$

2. **a.** $y = 3 + 2(x - 4)$ **b.** $y = 7 - \frac{2}{3}(x + 6)$
c. $y = 4$

3. **a.** The slope is 1.5 for each pair of points. The points lie on the same line, or are collinear.
b. $y = -10 + 1.5(x + 4)$
c. $y = -5.5 + 1.5(x + 1)$

4. **a.** 2
b–c. The possible equations are $y = 72 + 2(x - 74)$, $y = 76 + 2(x - 76)$, and $y = 80 + 2(x - 78)$.
e. No; no

5. Answers will vary; some possible answers:

$y = 3 + 2(x - 1)$, or $y = 7 + 2(x - 3)$
$y = 7 + 0(x - 3)$, or $y = 7 + 0(x - 5)$, or $y = 7$
$y = 7 - 2(x - 5)$, or $y = 3 - 2(x - 7)$
$y = 3 + 0(x - 1)$, or $y = 3 + 0(x - 7)$, or $y = 3$

LESSON 4.4 • Equivalent Algebraic Equations

1. **a.** Equivalent
b. Not equivalent; $-3x - 6$
c. Not equivalent; $-4x + 9$
d. Equivalent

2. **a.** $y = -7 + 3x$
b. $y = x - 1$
c. $y = -2 - 0.5x$
d. $y = 1 + \frac{1}{3}x$

3. The properties and solutions may vary. Sample answers are:

a.

$3(4x - 2) + 5 = 11$	Original equation.
$12x - 6 + 5 = 11$	Distributive property.
$12x - 1 = 11$	Add $-6 + 5$.
$12x = 12$	Addition property (add 1 to both sides).
$x = 1$	Division property (divide both sides by 12).

b.

$-4(5 + 2x) - 8 = -12$	Original equation.
$-4(5 + 2x) = -4$	Addition property (add 8 to both sides).
$5 + 2x = 1$	Division property (divide both sides by -4).
$2x = -4$	Subtraction property (subtract 5 from both sides).
$x = -2$	Division property (divide both sides by 2).

c.

$6 - 5(3x - 2) = -44$	Original equation.
$6 - 15x + 10 = -44$	Distributive property.
$-15x + 16 = -44$	Add $6 + 10$.
$-15x = -60$	Subtraction property (subtract 16 from both sides).
$x = 4$	Division property (divide both sides by -15).

d.

$-12 + 3(4 - 5x) = 12$	Original equation.
$3(4 - 5x) = 24$	Addition property (add 12 to both sides).
$4 - 5x = 8$	Division property (divide both sides by 3).
$-5x = 4$	Subtraction property (subtract 4 from both sides).
$x = -\frac{4}{5}$, or -0.8	Division property (divide both sides by -5).

4. a. $x = 1.75$ **b.** $x = 10$
c. $x = -4$ **d.** $x = -9$

5. a. $(-3.6, -20)$ **b.** $x = -23.8$

6. a. $4(x + 2)$ **b.** $-3(x + 9)$
c. $-6(x - 12)$ **d.** $10(x - 25)$

7. a. $q = \frac{p - 3}{7} + 2$
b. $b = \frac{9 - 3a}{-2}$, or $b = \frac{3a - 9}{2}$
c. $x = \frac{y + 4}{14} + 2$, or $x = \frac{y + 32}{14}$

LESSON 4.5 • Writing Point-Slope Equations to Fit Data

1. Answers may vary. Possible answers:
a. $y = 12 - 4x$, or $y = 4 - 4(x - 2)$
b. $y = \frac{1}{3}(x - 3)$, or $y = -1 + \frac{1}{3}x$
c. $y = -2 - 0.4x$, or $y = -4 - 0.4(x - 5)$
d. $y = \frac{5}{4}(x - 4)$, or $y = \frac{5}{4}x - 5$

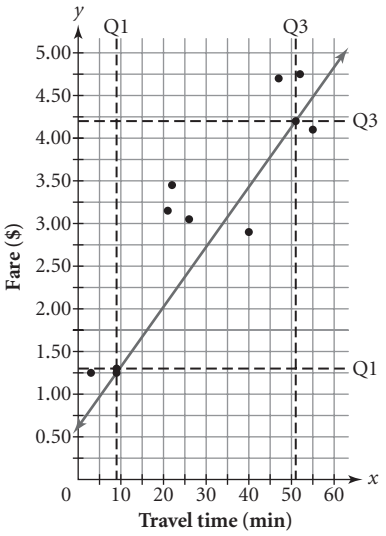
2. Answers will vary.

3. a. 4 **b.** -8
c. 9 **d.** -12

LESSON 4.6 • More on Modeling

1. a. Travel times: 3, 9, 26, 51, 55;
fares: 1.25, 1.30, 3.15, 4.20, 4.75

b–e.



c. (9, 1.30), (51, 4.20)
d. $y = 1.30 + 0.069(x - 9)$ or
$y = 4.20 + 0.069(x - 51)$
e. $2.54
f. 33 min

2. a. $(-7, 3)$ and $(-2, -3)$
b. $(-1, 2)$ and $(4.5, 4.5)$

LESSON 4.7 • Applications of Modeling

1. a. $y = 16 - 0.\overline{3}(x + 10)$, or $y = 10 - 0.\overline{3}(x - 8)$;
$y = -0.\overline{3}x + 12.\overline{6}$
b. $y = -14 + 2(x + 2)$, or $y = 22 + 2(x - 16)$;
$y = 2x - 10$

2. a. 24.2 mi **b.** 0.92 h, or 55 min

3. a. $x = 5$ **b.** $x = -3$ **c.** $x = 2.75$ **d.** $x = 1$

4. a. $y = 9x - 14$ **b.** $y = -2x + 6$
c. $y = \frac{3}{7}x - 2$ **d.** $y = \frac{1}{3}x + 8$

5. a. Q-points are (1993, 1.13) and (2000, 1.36). The Q-line slope is about 0.033. The slope means that the price of gas increased on average about 3.3 ¢/yr during that time period.
b. The equation of the Q-line is
$y = 0.033(x - 1993) + 1.13$, or
$y = 0.033(x - 2000) + 1.36$.
c. The Q-line model predicts that the average price for 2004 should be about $1.49. For the model to be correct, the average for the second half of the year would have to be $1.16. This is highly unlikely.

LESSON 5.1 • Solving Systems of Equations

1. a. Yes **b.** No; $0 \neq -\frac{4}{3}(-4) + 2$
c. Yes **d.** Yes
e. Yes **f.** No; $-\frac{2}{3} \neq 6\left(\frac{1}{2}\right) - \frac{5}{3}$

2. a. (2, 3) **b.** (3, 1) **c.** $(-1, 4)$
d. $(3, -2)$ **e.** $(4, -1)$ **f.** (4, 3)
g. $(-2, -1)$ **h.** $(-4, -3)$ **i.** $(1, -1)$

3. a. $(2, -3)$ **b.** $(-2, 4)$ **c.** (2, 1)
d. (6, −2) **e.** $(-2, 2)$ **f.** $(-2, 0)$

LESSON 5.2 • Solving Systems of Equations Using Substitution

1. a. No; $8 \neq -4(4) + 12$
b. No; $22 \neq 1.5(2) - 3.5(-6)$
c. No; $-1 \neq -1.5(2) + 5$ **d.** Yes

2. a. -3 **b.** 4 **c.** -7

3. a. $-2x - 2$ **b.** 4 **c.** $11x + 6$

4. a. (1, 1) **b.** $(-3, -1)$ **c.** (1, 3)
d. $(-3, 5)$ **e.** (2, 5) **f.** (1, 1)
g. (9, −3) **h.** $(-1, -4)$ **i.** (0, 1)

5. The problem can be solved using the equation $9.05x + 9(6.25) = 7.37(x + 9)$. He needs 6 lb of the $9.05/lb coffee.